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ABSTRACT

The speech of three Quiche Mayan children aged 2;1, 2;9, and 3;0 was monitored for the acquisition of the distinction between ergative and absolutive person markers. The children were found not to confuse markers, but to use either the appropriate one or none at all. The one exception to this rule, when analyzed, indicates that children grasp the distinction between person markers before they produce them in their own speech. Order of acquisition did not follow semantic predictability, nor did frequency order of person markers in adult speech consistently correlate with order of acquisition. Instead, perceptual saliency, as determined by interaction between forms of person markers and rules determining word stress and syllable boundaries, correlated significantly with acquisition order. These findings support a model of language acquisition in which children first produce those parts of utterances that have the greatest degree of perceptual saliency (i.e., that require the least auditory processing), and then move on to the next degree. (JB)

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The Acquisition of Person Markers in Quiché Mayan

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It has long been the fashion to seek the determinants of language acquisition in syntactic and semantic complexity. The present study suggests that perceptual saliency, defined in terms of segmentability and stress, may play an important role in language acquisition. The material in this study comes from longitudinal records of three Quiché Mayan children, ages 2;1, 2;9 and 3;0 when I began, and living in the Indian town of Zunil in the western highlands of Guatemala. I visited the children in their homes over a period of nine months, approximately once every two weeks for a one-hour play session, at which I made a recording of their speech. Quiché was the predominant language in all three households although some of the parents could speak Spanish. The children only spoke Quiché during the play sessions, this being the language that I used with them.

Quiché is an ergative language; one set of person markers (ergative) marks the subject of transitive verbs, the possessor in genitive constructions, and the object of relational nouns (which are similar to prepositions in English). Another set (absolutive) marks the subject of intransitive verbs and the direct object of transitive verbs. The person markers are obligatory in these environments and are bound to the word they mark. In Mayan studies, the ergative set of person markers is traditionally referred to as set A while the absolutive set is referred to as set B. Each set has six person markers: three persons in singular and plural. Each of the person markers in set A (the ergative set) has two allomorphs, one before vowel (or glottal stop)-initial stems and one before consonant-initial stems. The sets of person markers on verbs are given below:

Person	Set A _V	Set A _C	Set B
1	inw-	in-	in-
2	aw-	a-	at-
3	r-	u-	Ø
4	q-	qa-	uj-
5	iw-	i-	ix-
6	k-	ki-	e-

The person markers on genitives and relational nouns substitute /w-/ for A_V1 /inw-/ and /nu-/ for A_C1 /in-/. Otherwise they are exactly the same as the person markers on verbs. Some examples of the use of person markers in adult Quiché speech are shown in (1):

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- (1) x-in-pee r-uuk' lee in- taat x-in- u- til lee tz'17
asp-B1-come A_V3-with the A_C1-father asp-B1-A_C3-bite the dog
I came with my father. The dog bit me.

In early samples, the children typically uttered only one or two syllables of a word, usually the stem or the stem plus a suffix. The person markers, by and large, were missing. The intended referents of the children's utterances were clear from the linguistic and nonlinguistic contexts approximately 95% of the time (a benefit of discussing the here and now with children). The conversation shown in (2) is typical of this period:

- (2) Mother: lee katijoh katcha7. 'You eat them say.'
 Al Chaay (2;9) : toh. (c.f. lee k-Ø- a- tij- oh)
 those asp-B3-A_C2-eat-status
 M: jawii kaloq' wii liwaa katijoh katcha chareh
 'Where do you buy the food you eat, say to him.'
 Al Chaay: loq' wih waa?
 (c.f. jawii k-Ø- a-loq' lee i- waa)
 Where asp-B3-A_C2-buy the A_C5-food

With one exception, there was no confusion between the various person markers in the children's speech; they either used the appropriate marker or none at all. This contrasts with previous findings in such fusional languages as Portuguese (Simões and Stoel-Gammon 1979), Estonian (Lipp 1977), and Latvian (Rūķe-Draviņa 1973) where a single inflection encodes both person and tense, and where the third person singular of the indicative was the initial form the children used for every person. The exception in Quiché occurred in the children's use of the preconsonantal allomorph of the first person singular in possessive environments. This possessive marker is unusual in that it has two forms: one form /nu-/ is used to form the possessive in the vast majority of words while the second form /in-/ is used with only two words in my corpus, tat 'father' and chaj 'younger sibling'. The children produced utterances with nu-taat as compared with the adult form of in-taat 'my father'. This exception is easily explainable in terms of Slobin's (1973) principle of avoiding exceptions. What is surprising about the Quiché data is that the children did not apply this operating principle more thoroughly. For example, if the same semantic notion of agent underlay the subject of both transitive and intransitive verbs, one would expect the children to overgeneralize the set of ergative person markers and apply them to intransitive verbs, or one might expect the children to use preconsonantal forms of the ergative with words beginning with vowels. The fact that such overgeneralizations did not occur, despite the extremely high frequency of obligatory environments for person markers in the children's speech, implies that the children had already sorted out the different person markers in terms of their meaning before they began producing the person markers in their own speech.

The person markers showed extreme changes in their presence from sample to sample. This makes it difficult to apply Brown's (1973) and Cazden's (1968) criterion for acquisition of three successive samples of a ninety percent presence or greater. In order to reduce the variation between samples, I used only samples with five or more obligatory contexts as a basis for computing the morphemes' percentage presences. I then ranked the person markers in acquisition orders for all three children using the sample number for the morphemes acquired during the study and the final percentage for the morphemes not acquired. I used the Spearman rho (corrected for ties) to compare the person marker acquisition orders and found a significant correlation between the orders of person marker acquisition on verbs ($\rho = .59, .68, .70$; $p = .05$). The results for person markers on possessives and relational nouns were not significant, but this may have been due to the lack of data in these two environments. I obtained continuous data for eleven of the person markers on verbs, but only eight of the person markers on possessives, and five of the person markers on relational nouns. Combining the data for all three environments, I found a correlation at the .05 level of significance. This is an astonishing result given the nature of the morphemes being compared and the variation in the morphemes' presences from sample to sample. All of the person markers are instances of just the single morphological category of person marked on different words. The distinctions of case, person and number are much finer than the comparatively gross semantic and syntactic distinctions among the other grammatical morphemes for which invariant acquisitional orders have been demonstrated (Brown 1973, Lipp 1977).

I tested several possible determinants of the person marker acquisition orders separately for person markers on verbs, possessives and relational nouns. Syntactic complexity cannot be a major determinant of person marker acquisition in any of the three environments since the person markers are all introduced by the same agreement rules. Semantic complexity also seems to have little to do with person marker acquisition. If semantics was a determining factor, I would have expected the person markers with the same meaning (especially the prevocalic and preconsonantal allomorphs of the ergative set) to have been acquired at approximately the same times. In fact I tested such a set of semantic predictions in all three environments and found no significant correlation between the semantic predictions and the children's acquisition orders. The fact that the acquisition order of the person markers on verbs in Quiché was different from the acquisition orders reported for Portuguese (Simões and Stoel-Gammon 1979), Estonian (Lipp 1977), and Latvian (Rūķe-Draviņa 1973) would also seem to rule out semantics as a major determinant of person marker acquisition.

Another possibility is that the frequency with which the different person markers are modeled in adult speech determines their order of acquisition. One would expect children first to learn the person markers that they heard most often in the speech around them. To test this possibility, I first determined the frequencies of the

person markers in the speech of the children's mothers. The person markers were all present in over 90% of the obligatory environments in the mothers' speech. There was a significant correlation between the frequency rank-orders of the person markers on verbs in the mothers' speech. Once again, there may have been too few person markers in the other environments to be able to measure a correlation in person marker usage in the mothers' speech. When I tested the frequency order of the person markers on verbs in the mothers' speech and the children's acquisition orders, I found a negative correlation (Spearman $\rho = -.209$). I also examined the possibility that frequency was responsible for the variation between the children's acquisition orders by comparing the differences among the children's acquisition orders with the differences in the frequency rank-orders among the mothers. I found no indication in any of the three environments that frequency might account for the variation among the children's acquisition orders. This outcome is similar to one Brown (1973) found for American children learning English. I would agree with Brown that frequency does not play a significant role in children's acquisition of grammatical morphemes.

Frequency is just one factor related to the perceptual saliency of grammatical morphemes. While relatively little work has been done on the relation of speech perception to language acquisition (c.f. Eimas 1974), there is reason to suspect that three factors: phonetic substance, stress, and phrase-final position, make grammatical morphemes more salient perceptually for young children (Blasdel and Jensen 1970). The person markers in Quiché interact in subtle ways with the rules determining word stress and syllable boundaries, producing real differences in the morphemes' perceptual saliency. I give some examples of this interaction in (3) (a slash marks a syllable boundary and an apostrophe marks the syllable receiving the main word stress):

- | | |
|---|---|
| (3) ka-Ø- / r- íil lee w-e/tz'a/b'a7l | x-Ø- qa-/tíij qa-/ri/kí7l |
| asp-B3-A _v 3-see the A _v 1 toy | asp-B3-A _C 4- eat A _C 4- food |
| She sees my toy. | We ate our food. |
| ka-Ø- u-/q'a/lúuj lee r- aal | x-Ø- in-/k'aam w- uuk' |
| asp-B3-A _C 3- hold the A _v 3-baby | asp-B3-A _C 1-bring A _v 1-with |
| She holds her baby. | I brought it with me. |

In their early samples, the children produced forms that followed a segmentation according to syllable boundary rather than the actual boundary between morphemes. One of the children, for example, produced the utterances shown in (4):

- (4) A Carlos (3;0): wiloh. (c.f. k-Ø-a/w-íi/loh, asp-B3-A_v2-see-stat)
teloh. (c.f. ch-a/t-ee/l-óq, vol.-B2-leave-stat)

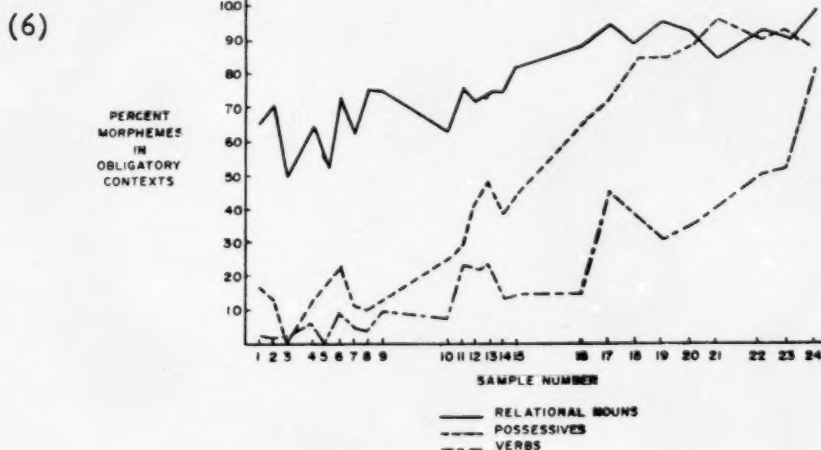
The utterance wiloh contains only the second part of the person marker A_v2 /aw-/ while the utterance teloh contains only the latter part of the person marker B2 /at-/. I found a general tendency

among all of the children in the early stages to reduce words to the single stressed syllable. This has a striking effect in Quiché since the language has an extremely regular system of word stress--stress always falls on the final syllable of the word.

The interaction between the forms of the person markers and the rules determining word stress and syllable boundaries might be responsible for the children's acquisition orders. A person marker that is entirely part of a stressed syllable should be easier to hear than a person marker that forms only an unstressed syllable which, in turn, should be more salient than a person marker that is occasionally split by the syllable boundary or one that is always split by the syllable boundary. On this basis, the person markers can be ordered according to their perceptual saliency as in (5):

- (5)
- | | Verbs | Possessives and Rel. Nouns |
|----------------|--|----------------------------|
| Most salient: | A_V3, A_V4 | A_V1, A_V3, A_V4 |
| Intermediate: | A_C1, A_C2, A_C3, A_C4
$B1, B2, B4$ | A_C1, A_C2, A_C3, A_C4 |
| Least salient: | A_V1, A_V2 | A_V2 |

(Perceptual saliency makes slightly different predictions for person markers on possessives and relational nouns since the forms of the person markers in these two environments are slightly different from the forms of the person markers on verbs.) I found a significant correlation ($\rho = .59, p = .05$ for person markers on verbs) between the children's acquisition orders and the predictions from perceptual saliency in all three environments. Moreover, perceptual saliency would predict that person markers would be acquired in the order: 1. relational nouns, 2. possessives, 3. verbs, since relational nouns tend to be one or two syllable words appearing in utterance-final position, verbs are usually polysyllabic and appear at the beginning of utterances, while possessives fall inbetween verbs and relational nouns in terms of their average number of syllables and utterance position. That this is what actually occurred may be seen in (6), which shows how one child acquired the



ergative markers on verbs, possessives and relational nouns.

Perceptual saliency then, defined in terms of susceptibility to word and sentence stress and lack of disjuncture caused by a syllable boundary, was significantly related to the children's acquisition of person markers in three different environments. This has some interesting implications for research on language acquisition. The most widely accepted approach to speech perception proposed so far is some kind of analysis by synthesis model (Stevens 1960). Hearers are said to generate their own models of what was said and then match these against the sounds retained in their acoustic memory. Such a theory accounts for the facts that hearers can follow what is being said in noisy environments or actually supply parts of sentences that were experimentally cut. Such hearers, however, have internalized an adult grammar of the language which enables them to generate models of what is being said. Hearers who are linguistically naïve have no such grammar with which to generate their models of what is being said. The analysis by synthesis model of speech perception would predict that young children find it more difficult than adults to perceive speech. If such is the case, one might expect children to first direct their attention to the more perceptually salient parts of utterances that require a minimum of auditory processing, and to use these "bright" parts of utterances as anchors for their perception and analysis of utterances. When the perception of such bright spots had become fairly well established and a matter of routine, children would move on to the next brightest parts of utterances and begin analyzing them.

My own findings indicate that children follow such a pattern in their production of speech, i.e. they first produce those parts of utterances with the greatest degree of perceptual saliency and then move on to the parts with the next degree of perceptual saliency. One might predict that in environments where semantic understanding preceded production, there would be few errors in grammatical morpheme usage, even though the morphemes were being supplied in a small percentage of their obligatory environments. The person markers in Quiché and the progressive marker in English (Brown 1973) are relevant examples. Where semantic understanding lags behind the production of a particular morpheme, one could expect the morpheme to be overgeneralized to inappropriate environments as was the case with the Quiché possessive allomorphs /nu-/ and /in-/ and the past tense of irregular verbs in English. However, the time at which a particular linguistic feature appears in children's speech is first of all dependent upon the perceptual saliency of the feature and not semantic or syntactic complexity. It may not be an accident after all that the prominent phonological features of human languages also encode major semantic roles.

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